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मानक

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IS 7898 (2001): Manually-Operated Chaff Cutter [FAD 20: Agriculture and Food Processing Equipments]



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भारतीय मानक
मानव-चालित चारा काटने की मशीन — विशिष्टि
(दूसरा पुनरीक्षण)

Indian Standard
MANUALLY-OPERATED CHAFF CUTTER —
SPECIFICATION
(*Second Revision*)

ICS 65.060.50

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Produce Processing and Milling Machinery Sectional Committee had been approved by the Food and Agriculture Division Council.

Manually-operated chaff cutters are very common in use by farmers for cutting the chaff. The chaff cutters vary in dimensions, material of construction and other quality characteristics considerably from manufacturer to manufacturer which causes great inconvenience to the user specially replacement of the components. A need was, therefore, felt for preparation of an Indian Standard to guide the manufacturers to produce quality product and also to help the users in selection of good quality chaff cutters.

This standard was first published in 1975 and was revised in 1981. In order to include certain provisions for operator's safety, the standard is revised again. Due to varying conditions of the fodder to be cut it was not possible to stipulate the cutting capacity requirement but test for judging the variation in length of cut and idle-run test have been stipulated.

Figures given in this standard are meant for illustration of various components and dimensions of chaff cutters and they should not be treated as suggestive of any standard design.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960. 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MANUALLY-OPERATED CHAFF CUTTER — SPECIFICATION (Second Revision)

1 SCOPE

This standard specifies material, construction and other requirements for manually-operated chaff cutter (see Fig. 1).

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to

revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
210 : 1993	Grey iron castings (<i>fourth revision</i>)
399 : 1963	Classification of commercial timbers and their zonal distribution
407 : 1981	Brass tubes for general purposes (<i>third revision</i>)

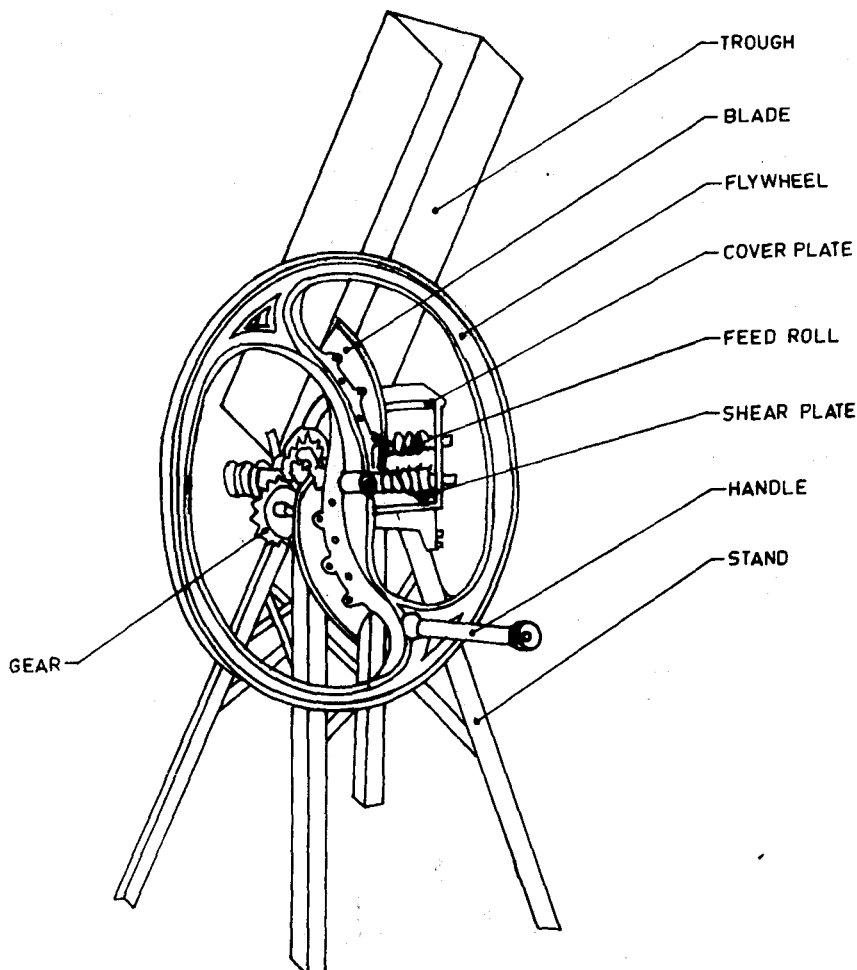


FIG. 1 TYPICAL DRAWING OF MANUALLY-OPERATED CHAFF CUTTER

IS No.	Title
1500 : 1983	Method for brinell Hardness test for metallic materials (<i>second revision</i>)
1511 : 1979	Blades for manually-operated chaff cutter (<i>second revision</i>)
2062 : 1992	Steel for general structural purposes (<i>fourth revision</i>)
2102 (Part 1) : 1993	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (<i>third revision</i>)
4454 (Part 1) : 1981	Steel wires for cold formed springs: Part 1 Patented and cold drawn steel wires-unalloyed (<i>second revision</i>)
7201 (Part 1) : 1987	Method of sampling for agricultural machinery and equipment: Part 1 Hand tools and hand operated/ animal drawn equipment (<i>first revision</i>)

3 MATERIAL

3.1 The material for construction of various components of the chaff cutter, other than blade, shall be as given in col 3 of Table 1. The material may conform to Indian Standards given in col 4 of Table 1.

3.2 The material for construction of blade shall be as given in 2.1 and 2.1.1 of IS 1511.

4 HARDNESS

4.1 All cast iron components shall have a hardness of 160 to 220 HB (*see* IS 1500).

4.2 The hardness of the blade shall be as given in 3.1 of IS 1511.

5 CONSTRUCTIONAL REQUIREMENTS

5.1 Handle

Handle shall consist of handle support of mild steel rod and a wooden grip placed over the rod. The diameter of the handle support (*see A* in Fig. 2) shall be minimum of 15 mm. The total length of the handle (*see B* in Fig. 2) shall be at least 500 mm and the

Table 1 Material of Construction
(Clause 3.1)

Sl No.	Parts	Material	Applicable Indian Standard IS No.
(1)	(2)	(3)	(4)
i)	Flywheel	Cast iron	210
ii)	Handle grip	Hard or Medium hard wood	399
iii)	Handle support	Mild steel	2062
iv)	Frame	Cast iron	210
v)	Cover plate	Cast iron	210
vi)	Shear plate	Cast iron	210
vii)	Feed rolls	Cast iron	210
viii)	Spring	Spring steel	4454 (Part 1)
ix)	Bush bearing	Brass	407
x)	Worm and worm gear	Cast iron	210
xi)	Leg	Mild steel	2062
xii)	Leg support	Mild steel	2062
xiii)	Fingers, if separate	Cast iron	210
xiv)	Shaft and axles	Mild steel	2062
xv)	Feeding trough	Timber	399
		Mild steel	2062
xvi)	Blade cover	Mild steel	2062
		Plastics	—

length of wooden grip (*see C* in Fig. 2) shall be 430 mm to 450 mm. The diameter of the grip (*see D* in Fig. 2) shall be 37 mm to 42 mm. The grip shall be properly attached with the support. The one end of the support shall be threaded. The handle shall be attached with fly wheel by a hexagonal nut with washers.

5.2 Flywheel

A flywheel of 900 mm to 1 350 mm diameter (*see A* in Fig. 3) shall be provided. The flywheel shall have two arms. Each arm shall be provided with one square hole for fixing the handle; three holes for fixing the blade and six tapped holes for fixing the bolts for blade setting adjustment. At the centre of the flywheel a circular hole shall be provided for connecting it to the main shaft. A hole of 10 mm diameter shall be made in the rim of the flywheel parallel to direction of the hub hole. The weight of the fly-wheel shall not be less than 24 kg.

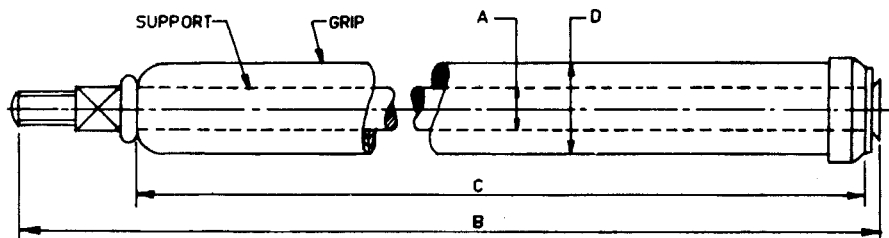


FIG. 2 HANDLE

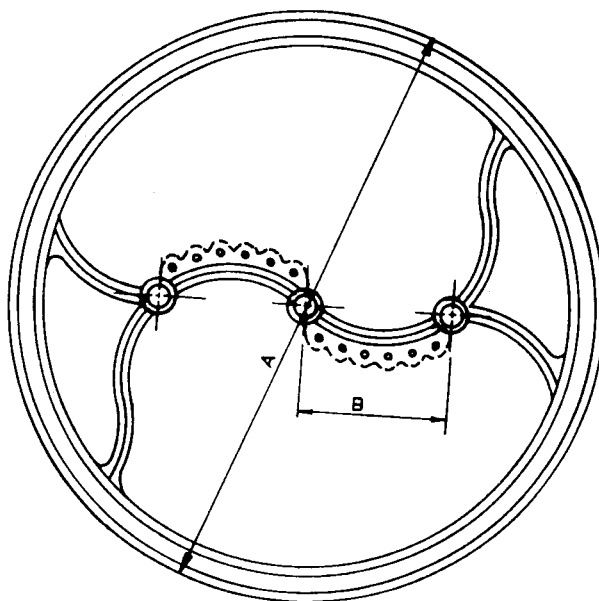


FIG. 3 FLYWHEEL

5.3 Main Shaft

The one end of the main shaft shall be rigidly attached at the centre hole of flywheel and other end may be supported on a plumber block. The length and diameter of the shaft (*see A and B in Fig. 4*) shall be 400 mm and 30 mm respectively. Plumber block shall be provided with bush or ball bearing.

5.4 Worm

The worm shall be fitted on the main shaft. The hole size of the worm (*see A in Fig. 5*) shall be such that it should push fit on the main shaft. the outer diameter and length of the worm (*see B and C in Fig. 5*) shall be 75 mm or 80 mm and 155 mm respectively. The pitch of the worm (*see D in Fig. 5*) shall be 25 mm. It shall be provided with two holes for proper fixing to the shaft. The distance of centre of hole from the end of the worm (*see E in Fig. 5*) shall be 50 mm or 13 mm.

NOTE — The pitch of the worm at both ends shall be 25 mm but teeth at one end may be double start to enable to have two chopping length by reversing the worm.

5.5 Worm Gears

There shall be two gears; one located at upper side and other at the lower side of the worm. The outer diameter of the gears (*see A in Fig. 6*) shall be 125 mm or 133 mm and there shall be 15 teeth in each gear. At the option of the purchaser the gears may have 11 or 13 teeth. The gear shall be attached with axles by hexagonal bolts.

5.6 Feed Rolls

There shall be two feed rolls. The length and outer diameter of the rolls (*see A and B in Fig. 7*) shall be 207 mm and 75 mm or 85 mm respectively. Each roll shall have eight projections on circumferential periphery. The lower roll shall have 11 full teeth and upper roll 10 full and two half teeth on lengthwise fixing the axles (*see C in Fig. 7*).

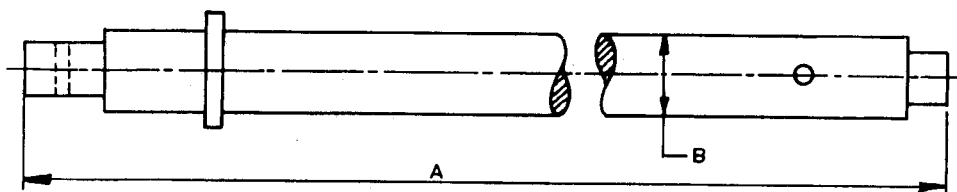


FIG. 4 MAIN SHAFT

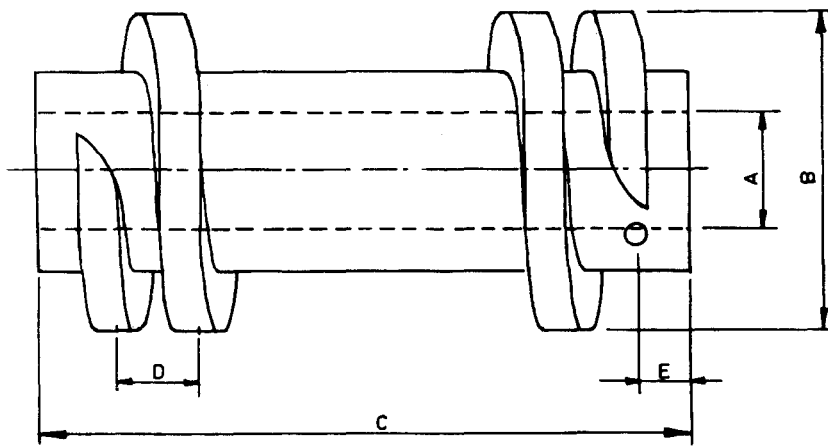
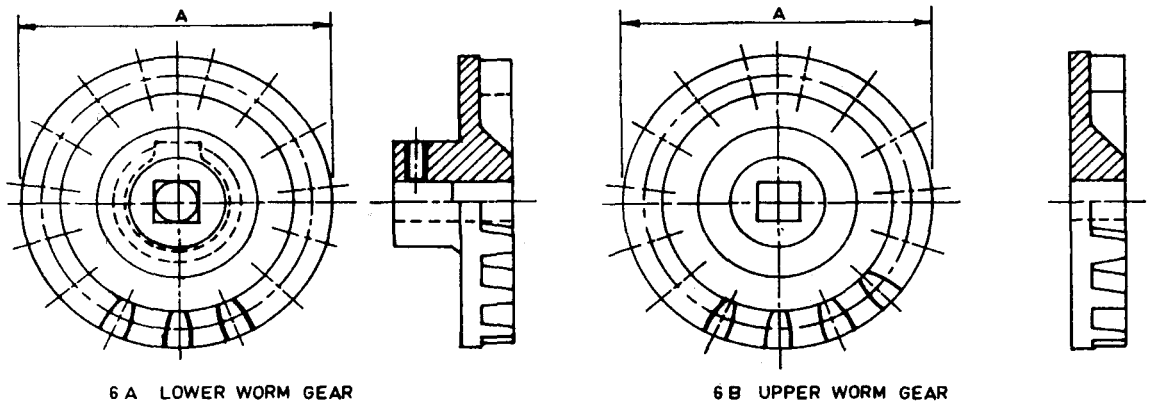


FIG. 5 WORM



6 A LOWER WORM GEAR

6 B UPPER WORM GEAR

FIG. 6 WORM GEAR

5.7 Springs

Two tension springs shall be provided to keep the upper roll in tension. Total length of each spring (see *A* in Fig. 8) shall be minimum 95 mm. The outer diameter (see *B* in Fig. 8) shall be 20 mm, the wire diameter shall be 2.5 mm and the number of coils shall be 18.

5.8 Cover Plates

Two sides and one top cover plates shall be provided to protect the feed rolls as well as for proper mounting of the worm and worm gears. Both the side plates shall be attached to a tie rod. The rod shall be of minimum 225 mm in length with both the ends threaded. The top cover plate shall have 11 full teeth.

5.9 Shear Plate

A rectangular plate with top open, shall be attached at the front of the feed rolls. The width and height of

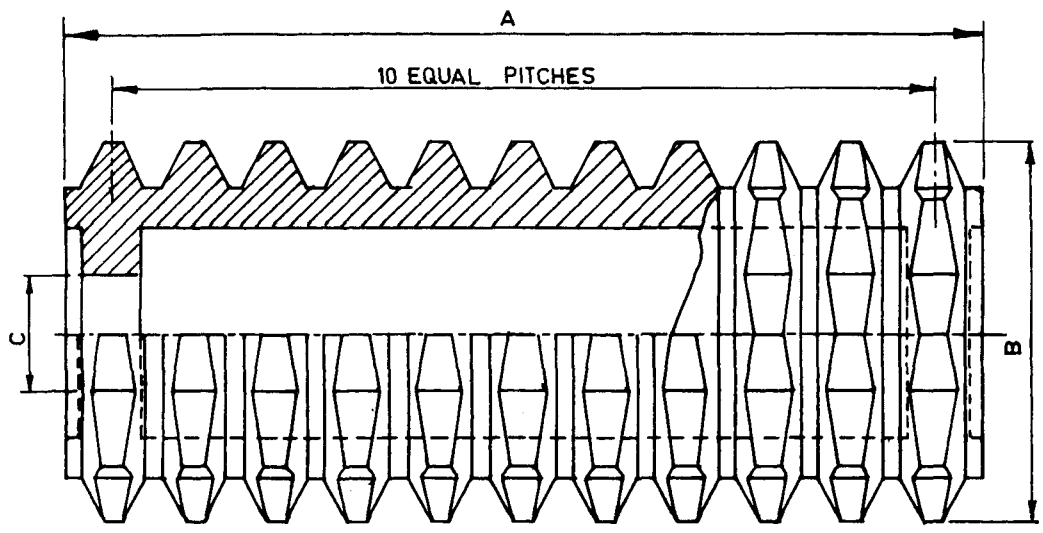
the plate (see *A* and *B* in Fig. 9) when measured internally shall be minimum 207 mm and 105 mm respectively. The shear plate shall have 12 full teeth.

5.10 Back Plate

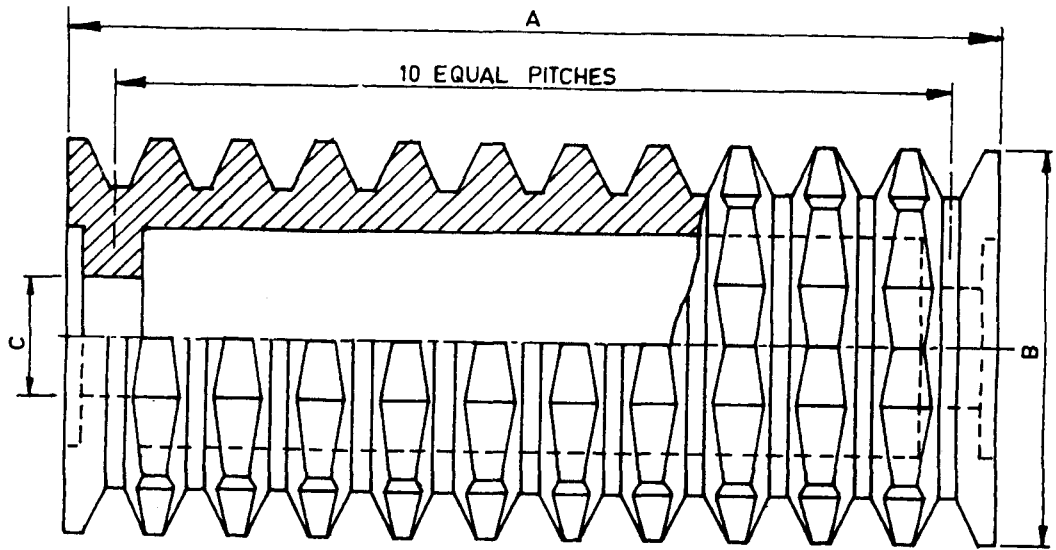
There shall be one back plate fitted in between two side plates at the rear. The length of the back plate (see *A* in Fig. 10) shall be 207 mm and width (see *B* in Fig. 10) including teeth shall be 145 mm. There shall be 12 teeth in the back plate.

5.11 Feeding Trough

A rectangular or trapezoidal trough shall be attached on the rear side of the shear plate. The trough shall be detachable. Provision for changing the angle of placement of trough shall be provided. At the rear side of the trough a support should be provided. The total length of the trough shall be minimum of 900 mm.



7A LOWER FEED ROLLER



7B UPPER FEED ROLLER

FIG. 7 FEED ROLLERS

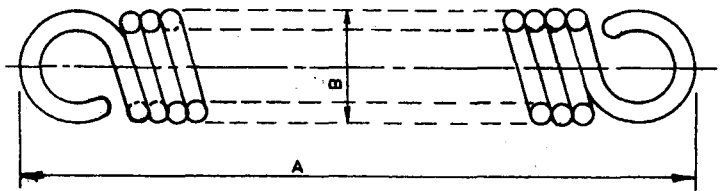


FIG. 8 SPRING

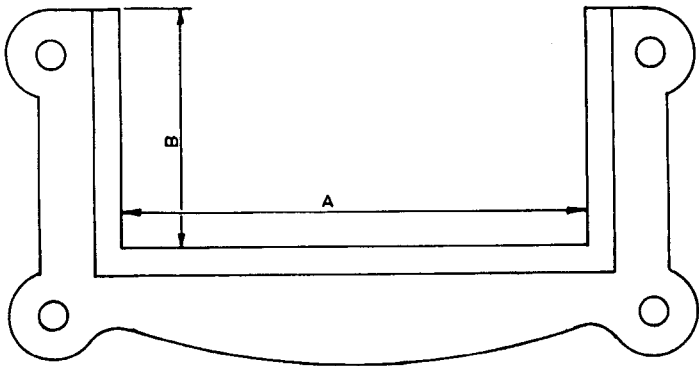


FIG. 9 SHEAR PLATE

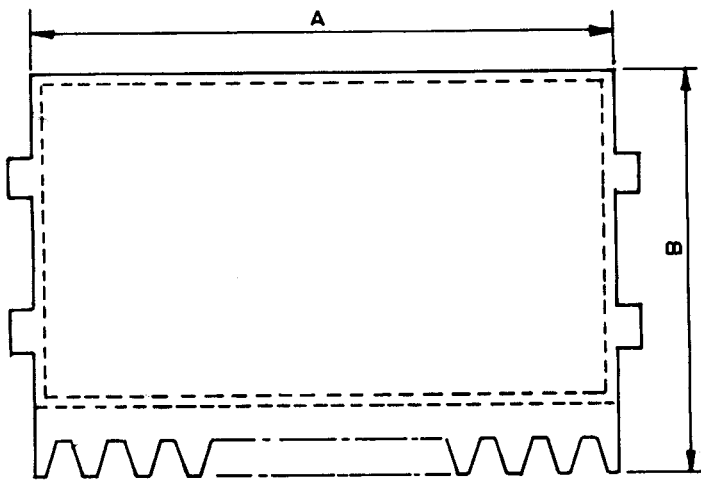


FIG. 10 BACK PLATE

5.12 Stand

Stand shall consist of four legs, leg supports and one finger in each leg. The leg shall be made of angle section of minimum 50 mm × 50 mm × 2 mm size. The leg support may be detachable or riveted with the leg. The fingers may be a separate component attached to the leg or may be made by taking out at the bottom of each leg. The total height, length and width of the stand (*see A, B and C in Fig. 11*) shall be minimum of 750 mm, 600 mm and 550 mm respectively. In one of the legs a hole of 10 mm shall be provided at a point coinciding with the hole made in the rim of the fly wheel.

5.13 Allowable deviations for dimensions without specified tolerance shall be as given in IS 2102 (Part 1).

6 OTHER REQUIREMENTS

6.1 The worm gears should as far as possible, be

enclosed and should preferably be run on an oil trough.

6.2 The bearings shall be completely enclosed and shall have provision for lubrication.

6.3 Provision shall be provided to change the inclination of the plane of the cutting knives to the plane of rotation of fly wheel to avoid feed interference.

6.4 Provision to change the direction of rotation of feed rolls should be provided.

6.5 Hooks at suitable places may be provided for lifting the chaff cutter for easy movement.

6.6 The maximum height of cranking from ground level shall be within 800 to 900 mm. The cranking radius shall be 250 to 350 mm (*see B in Fig. 3*).

6.7 All the three sides of shear plate shall be in one plane.

6.8 The blades shall conform to IS 1511.

6.9 Operational manual giving operational, maintenance, assembly instructions and adjustments shall be supplied by the manufacturer with each chaff cutter. Instructions for safe operation of chaff cutter shall also be provided.

7 TESTS

7.1 Idle Run Test

Fix the chaff cutter on level and preferably on hard surface. Operate it for 30 minutes. During the operation, observation shall not show the following:

- a) Presence of any marked oscillation,
- b) Presence of knocking or rattling sound,
- c) Obstructions in running of shafts in bearings, and
- d) Any marked unusual wear or slackness in any component.

7.2 Test for Variation in Cut Length

7.2.1 Installation

Fix the chaff cutter firmly on the level and preferably hard surface. Set the clearance between blade and shear plate and make other adjustments in accordance with the manufacturer's recommendations for cutting a particular length of the chaff.

7.2.2 Fodder

Take sufficient quantity of fodder to be cut. The fodder should be of same variety and free from roots. The length of the fodder should, as far as possible, be the same.

7.2.3 Theoretical Length

The theoretical length of the fodder to be cut shall be

obtained by the following formula:

$$x = \frac{n}{N} \times \frac{22 \times D}{7 \times R}$$

where

- x = Length of cut, mm;
- n = rev/min of feed roll;
- N = rev/min of fly wheel;
- D = Diameter of the feed roll; and
- R = Number of blades.

7.2.4 Operation

Operate the fly wheel of the chaff cutter at 50 rev/min and feed the fodder manually. Ensure that the feeding is done continuously and covers full width and height of the throat. The feeding should be done from root side of the fodder. While feeding, a rigid plastic pipe of diameter of 12 mm to 15 mm and 2 m in length shall be fed along with the fodder. Duration of the operation shall be such that at least 25 pieces of plastic pipes are cut.

7.2.5 Measurement

Select 25 pieces of plastic pipe and measure the length of each piece in mm. Obtain the average length of cut.

7.2.6 Observation

Compare the average measured length of cut with the theoretical length (see 7.2.3). The variation in length shall be not more than 5 percent.

8 SAFETY REQUIREMENT

8.1 Each manually-operated chaff cutter shall be

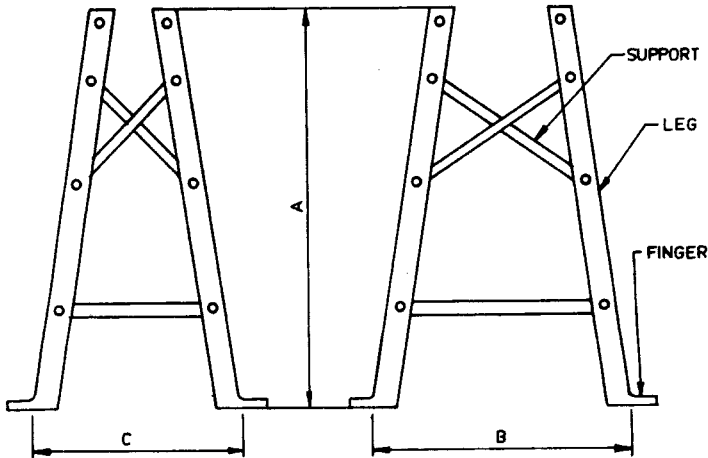


FIG. 11 STAND

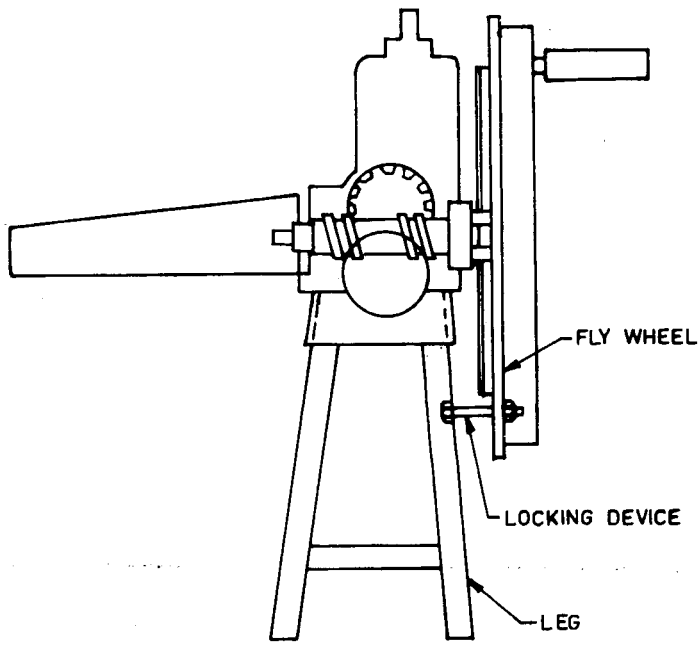


FIG. 12 A TYPICAL LOCKING ARRANGEMENT FOR CHAFF CUTTER

provided with safety provision as given in 8.1.1 to 8.1.7 (see Fig. 12).

8.1.1 Flywheel Locking Device

A suitable hole shall be provided in the bush and

flywheel shaft for fixing a locking pin for fixing the flywheel in a position when the machine is not in use (see Fig 12) or alternatively a bolt shall be fitted in both the holes (hole of leg and hole of flywheel rim) and tightened with nut so that the fly wheel shall not move when not in work (see Fig. 13).

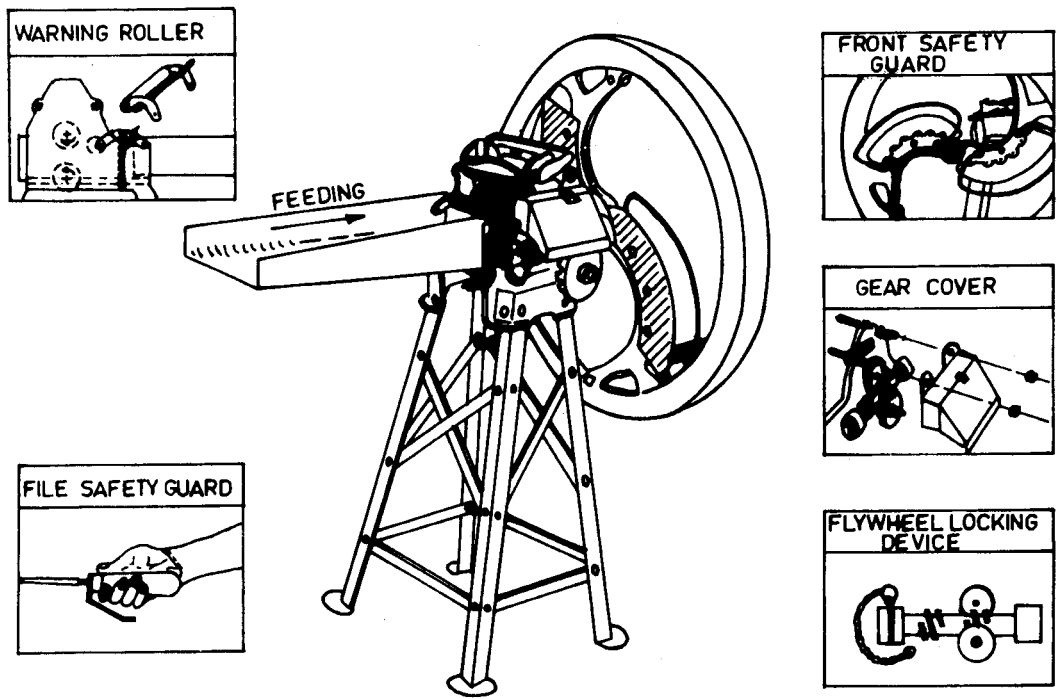


FIG. 13 SAFETY MEASURES ON EXISTING FODDER CUTTER

8.1.2 Front Safety Guard

A front safety guard shall be fitted on each knife blade tightly as a safety device (see Fig. 14).

8.1.3 Gear Cover

Warm and pinion assembly shall be covered from all the sides by a metal sheet as shown in Fig. 13.

8.1.4 Warning Roller

A warning roller which is a sort of idler roller with spring (see Fig. 15) shall be fitted just before the feeding rollers as an alternate to cover chute (see 8.1.5).

8.1.5 Covered Chute

The trough on the shear plate side shall be covered upto a length of 450 mm minimum (see 8.1.4).

8.1.6 Blade Cover

Each blade shall be covered with a cover. A typical shape and dimension of the blade cover is given in Fig. 16.

8.1.7 A minimum cautionary notice worded as follows shall be written in vernacular language legibly on a label preferably fixed on the main body of the chaff cutter:

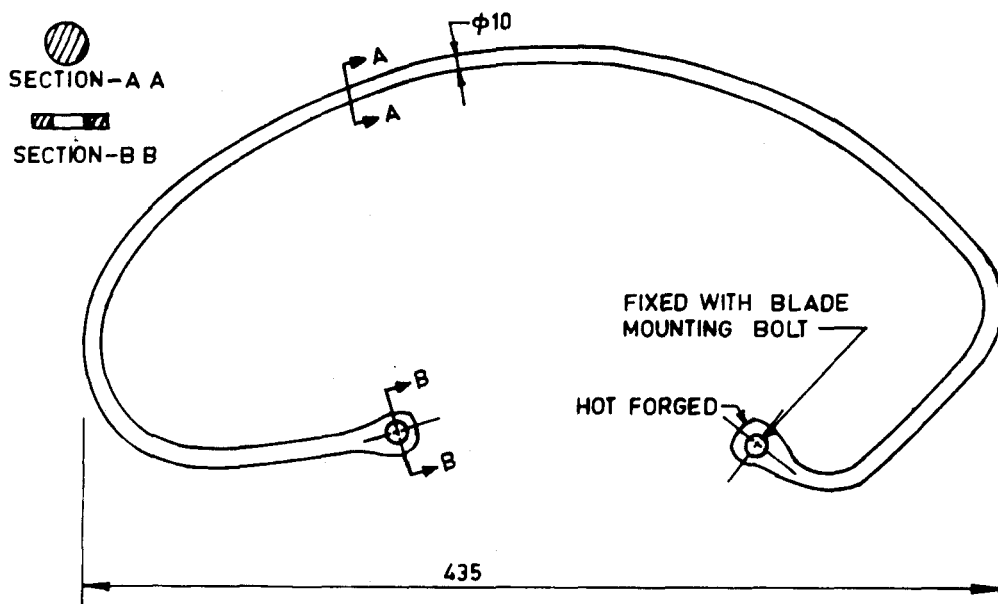
- a) Do not wear loose dress, bangles, watch, etc, while feeding the fodder;
- b) Do not smoke and light fire near dry fodder being cut;
- c) Do not work under the influence of intoxicants like liquor, opium, etc;
- d) Children and aged persons should be discouraged for working;
- e) Do not push small fodder by hand, use pushing device;
- f) Put the cover on blade after completing the work;
- g) Lock the flywheel with the locking pin after work; and
- h) Never bring hand near feed rolls and open blade.

9 WORKMANSHIP AND FINISH

9.1 All the components of the chaff cutter shall be free from cracks and such other defects that may be detrimental for their use.

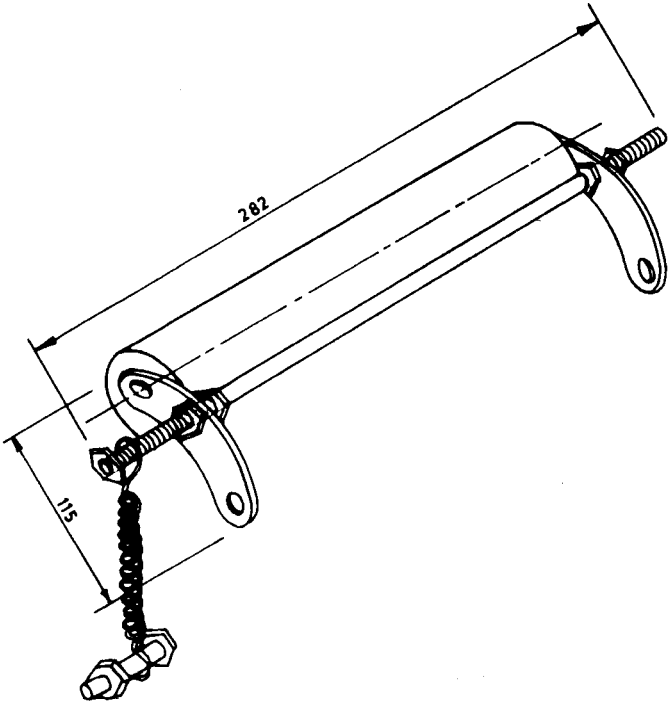
9.2 The cast iron components shall not be porous. Welding, if done, shall also not be porous.

9.3 All exposed metallic surfaces shall be free from rust and may be painted, if required.

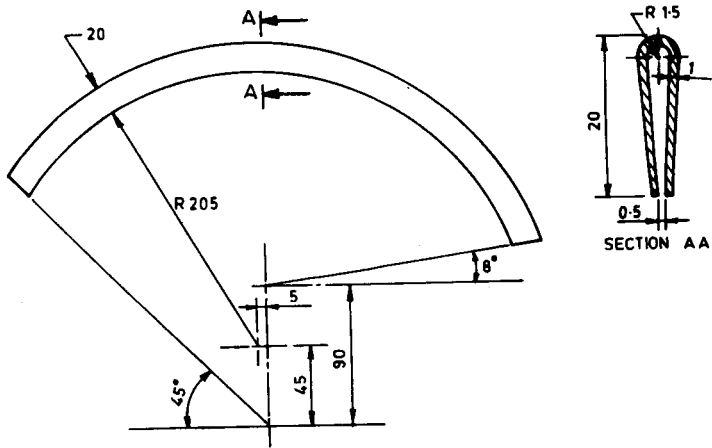


All dimensions in millimetres.

FIG. 14 FRONT SAFETY GUARD



All dimensions in millimetres.
FIG. 15 WARNING ROLLER



All dimensions in millimetres.
FIG. 16 BLADE COVER

10 MARKING AND PACKING

10.1 Marking

Each chaff cutter shall be marked with the following particulars:

- a) Manufacturer's name or registered trade-mark; and

- b) Code and batch number.

10.2 BIS Certification Marking

Each chaff cutter may also be marked with the Standard Mark.

10.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986*

and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

10.3 Packing

For ease in packing for transportation, the chaff cutter

may be dismantled in suitable sub-assemblies. The packing shall be done as agreed to between the purchaser and the supplier.

11 SAMPLING FOR LOT ACCEPTANCE

Unless otherwise agreed to between the purchaser and the supplier, the criteria for sampling for lot acceptance shall be in accordance with 3 of IS 7201 (Part 1).

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. FAD 51 (827).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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